



# CMOS Camera User Manual

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# 1. Notification

## 1.1. Disclaimer

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## 1.3. Warning

Connecting the wire inputs can be hazardous to both the installer and your vehicle's electrical system if not done by an experienced installer. This document assumes you are aware of the inherent dangers of working in and around a vehicle and have a working understanding of electricity.

## 2. Overview

The ATrack CMOS Camera is a solution to capture a snapshot in the event occurrence or by manually taking a picture. The picture will be sent via GPRS to the server with segments, and the server can reconstruct it to a JPEG format easily. Ideally, this solution is not only an add-on to the tracker, but also providing a complete solution to fleets with high sensitivity. For example, this solution could be applied to Taxi to ensure both drivers' and passengers' safety and avoid unclear conflicts. Valuables in transit or armored cars can utilize this solution to ensure its whereabouts and have a picture taken when moved.



### 2.1. Package Content

Camera with male DB9 \* 1



Camera Fixing Rack \* 1



Camera Cover \* 1

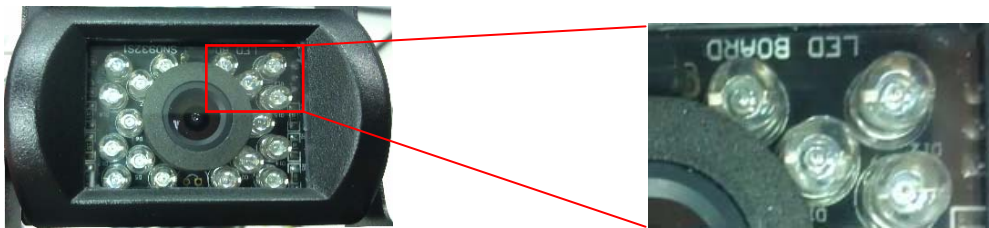


Screws \* 9



### 3. Installation

With the IP67 rating, the camera can be installed not only in the driver cabin to ensure the safety, but also outside of the vehicle for accident monitoring or security measurements. The camera should be positioned which the character on the LED board is upside down (as shown below) in order to get an upright picture.



If the fixing position is not feasible as above, the picture can be rotated after reconstruction from the raw packet.

Once the camera is fixed in position, the only wiring for getting the power and communication is the RS-232 cable. On the camera, a DB9 male connector is attached. It is connected to ATrack tracking device serial cable (DB9 female connector).



## 4. Configuration

In the ATrack tracking devices, the camera parameter has to be set in order to get the picture taken automatically when event occurs. The other method is to send a command to get the picture taken on demand.

### 4.1. AT\$SCAM Set or query the picture resolution in auto mode

Command Description			
This command is used to set or query the picture resolution for capturing a picture by event. Picture data is only sent via GPRS to server. If no GPRS is available, the picture taken will be queued and sent until GPRS connection is established.			
Syntax			
Write Command	AT\$SCAM=<Picture Resolution>		
Response	\$OK		
Read Command	AT\$SCAM=?		
Response	\$SCAM=<Picture Resolution>		
Parameter Description			
Parameters	Description	Data Type	Default
<Picture Resolution>	1: Low resolution (160 x 128 pixels) 2: Medium resolution (320 x 240 pixels) 3: High resolution (640 x 480 pixels)	U8	1
Example			
Set medium resolution for event captured picture.  AT\$SCAM=2  \$OK			
Remark			
<input checked="" type="checkbox"/> MEMO <input checked="" type="checkbox"/> SERIAL <input checked="" type="checkbox"/> SMS <input checked="" type="checkbox"/> GPRS			
<b>Note:</b> A report with ID <b>22</b> will be sent once the picture is successfully taken, and the picture data will be sent following this report. A report with ID <b>23</b> indicating that the picture taking is failed.			

## 4.2. AT\$GCAM Manual Capture A Picture (Picture On Demand)

Command Description			
This command is used to capture a picture when the device receives it. Note that the picture data will only be sent through GPRS no matter if the AT\$GCAM command is coming from SMS, GPRS, or Serial port.			
Syntax			
Write Command	AT\$GCAM=<Picture Resolution>		
Response	\$OK		
Parameter Description			
Parameters	Description	Data Type	Default
<Picture Resolution>	1: Low resolution (160 x 128 pixels)	U8	0
	2: Medium resolution (320 x 240 pixels)		
	3: High resolution (640 x 480 pixels)		
Example			
Capture medium resolution picture.  AT\$GCAM=2  \$OK			
Remark			
<input type="checkbox"/> MEMO <input checked="" type="checkbox"/> SERIAL <input checked="" type="checkbox"/> SMS <input checked="" type="checkbox"/> GPRS			
<b>Note:</b> A report with ID <b>22</b> will be sent once the picture is successfully taken, and the picture data will be sent following this report. A report with ID <b>23</b> indicating that the picture taking is failed.			

## 5. Data Format and Picture Reconstruction

**ALL THE PICTURE DATA PACKETS SENT ARE IN BINARY FORMAT.**

After the picture is taken, the device will then start to send the picture data in the following format:

Header					Data				
Prefix	CRC	Length	Seq. ID	Unit ID	RTC	Pkg ID	Ttl Pag	Pkg Size	Picture Data
2	2	2	2	8	4	1	1	2	Varied Length
			Calculated Length						
			Included for CRC calculation						

The header fields are the same as standard position messages, except the default Prefix. The default Prefix in Picture packet will be **@R**.

In Data fields:

RTC: RTC time of the picture taken

Pkg ID: Package ID of this packet. The picture data should be reconstructed in the order of Pkg ID

Ttl Pkg: Total number of packages for this picture

Pkg Size: The size of Picture Data in this packet. This is used to identify the size. Usually the last package will have less size than the others. A sum of this field could be used to check if the picture reconstruction is correct or not.

Picture Data: This is the picture data in JPEG format. Construct it by saving the Picture Data in order with a file extension of .jpg.



## 6. Picture Examples

Following are the example pictures taken in different resolutions (Note: pictures have been cropped and combined to make the comparison):

**Day Vision** (resolutions from top to bottom – 160x128; 320x240; 640x480):



**Night Vision** (resolutions from top to bottom –160x128; 320x240; 640x480):



## 7. Example Usage

The following examples assume that the basic communication settings are done on the device (i.e. AT\$GPRS, AT\$GSM, or AT\$FORM).

### 7.1. Manual Picture Capturing

This is the easy part; as whenever you would like to capture a picture, just send a command to the device via SMS or GPRS. The device will return the picture to the server via GPRS.

Example: get a high resolution picture (640 x 480 pixels)

```
AT$GCAM=3
```

### 7.2. Auto Picture Capturing Based On Event

Based on the application, the command can be set as to capture a picture and sent to server. The control on the report action is bit 5. For example, if a panic button is attached to input 1 in the tracking unit with a camera attached, the device can capture a picture when the panic button is pushed by the following settings:

```
AT$REPT=101,1,"%IN1","1",0,1
```

```
AT$RACT=1,35,2
```

A picture will then be taken and sent after the report 101 is sent and logged.

## 8. Appendix

### 8.1. Hardware Specification

CMOS Camera	
Image sensor	CMOS 0.3 mega pixels
Image Resolution	160x128, 320x240, 640x480 pixels
Image Compression	JPEG
Focal Length	2.8mm
Angle of View	120°
Minimum lumen	1 Lux
Night Vision lumen	5 Lux
Night Vision Image	Black-White Image
Night Vision Distance	3-10 Meters
Power Consumption	30~170mA @ DC5V
Length of Cable	3 Meters (DB9 Male Connector)
Weight	0.4Kg
Size	L*W*H: 70*75*75mm (with metal bracket)
Operating Temperature	-20°C~ +65°C
Operating Humidity	5% R.H. ~ 95% R.H. non condensing
IP Rating	IP67